Spanning the Gap



Trees at Rest:

How and why leaves change color in the fall

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By Jeanine Ferrence

Why do trees change color? And how?

The beauty you see is a matter of life and death to trees. During the summer, leaves are essential for photosynthesis-the process by which plants capture the sun's energy and make food for growth and life.

Leaves contain a large amount of chlorophyll, a green pigment which leaves use to absorb sunlight and make sugars. Yellow and orange pigment are also present in leaves, but in spring and summer they are overpowered by the green chlorophyll.

In winter, however, leaves become a liability. Water on the surface of the leaves would evaporate, causing the tree to lose moisture, which is difficult for the tree to replace in winter when when the ground is frozen. Leaves would also run the risk of the tree being damaged when water within them freezes and expands.

So in the fall, when the tree prepares for winter, a corky layer prevents water from entering the leaves. Without water for its leaves, the tree stops making chlorophyll, and gradually the old chlorophyll wears out. Then the leaves reveal colors that were hidden within them all summer long.

That accounts for yellow and orange leaves, but what about those dramatic red leaves?



The corky layer doesn't just stop water from entering the leaves; it also stops sugars from going out of the leaves. When the sun shines on the leaves, the sugars react with a chemical in the leaf to form a red pigment. A leaf that is totally in the shade will not turn red, even on a tree that usually turns red.

By mid-October, the Delaware Valley is alight with color. The vibrant reds, yellows, oranges, and greens inspire even the most passive viewer to a child-like wonder at the miracle of fall.

Jeanine Ferrence is a park ranger and the Pennsylvania District Supervisor for Visitor Services.

(Top to bottom) sugar maple, paper birch, white oak, chestnut, tulip poplar